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Complete Specification entitled (54) AN OVAL-HEADED SCREW

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Related Art (56) Nil

The following statement is a full description of this invention, including the best method of performing it known to me:

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The invention relates to a screw-threaded fastening element with a slot-free head.

The slotted and hexagon shapes of the heads of conventional wood and machine screws do not provide an aesthetically pleasing appearance, and are subject to disfigurement during tightening and loosening of the screws.

When used in public places, furthermore such conventional screws are readily removable by vandals.

The present invention provides an externally screw-threaded fastening element having a new improved head construction which can be manufactured by high speed production methods at lower cost than conventional screw heads, and which presents a neater and more ornamental appearance than the slotted hexagonal heads heretofore used.

More importantly, when used in public places they are much more difficult to remove because a special tool is required which means that the screw is comparatively tamper proof. This, therefore, tends to discourage vandalism and the pilfering of fittings and attachments from public places.

According to the invention, there is provided a screw-threaded fastening element having a head which has the shape of a truncated oval-section cone with a part-spherical end surface at the smaller end of the head coaxially aligned with the intersection between first and second

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axial planes respectively containing the major and minor diameters of the cross-section of the head, and a radiused edge between the part-spherical end surface and the side surface of the head, the curvature of the radiused edge increasing from a minimum at the intersection of this edge with the first axial plane to a maximum at the intersection of this edge with the second axial plane.

A screw such as this can be rotated with a socket-type screw driver or spanner at higher speed and tightened to the desired degree with far less effort and attention than ordinary screws and without danger of the head becoming disfigured or of the surface adjacent the

head being marred.

The invention therefore also provides a tool fastening and unfastening such a fastening element, comprising a socket formed with a tapering cavity of oval-shaped cross-section which is complementary to the truncated conical shape of the head of the fastening element.

A set screw and a screw driver embodying the invention are hereinafter described, by way of example, only, with reference to the accompanying drawings in which:

Fig. 1 is a plan view of the screw showing the oval-shaped cross-section of the head of the screw;

Figs. 2 & 3 are front and side elevations of the screw, respectively aligned with major and minor diameters of the head of the screw; and

Fig. 4 is a part-sectional partial elevation of a socket-type screwdriver engaging a screw securing an annular member to a base member.

As shown in Figs. 1 to 3, the set screw has a screw-threaded stem 1 and an oval-section head 2. The head 2 has the shape of a truncated oval-section cone with a part-spherical surface 3 co-axially aligned with the intersection between the major and minor diameters of the oval-shaped cross-section of the head 2 at the smaller end of the head 2. The edge between the part-spherical surface 3 and the convergent side surface of the head is radiused, and the curvature of the radiused edge increases from a minimum in an axial plane containing the major diameter of the oval cross-section of the head 2, as shown in Fig. 2, to a maximum in an axial plane containing the minor diameter of the oval cross-section of the head 2,

as shown in Fig. 3.

As the angle a' of inclination of the side surface of the head 2, at opposite ends of the major diameter, is approximately the same as ~~greater than~~ the angle a" of inclination of the side surface at opposite ends of the minor diameter, and the inclination of the part-spherical surface 3 adjacent the extremities of the major diameter is greater than the inclination adjacent the extremities of the minor diameter, the smaller curvature or increased radius of the radiused edge 4 at the extremities of the major diameter disguise the oval shape of the head and give the head a more truly circular appearance. For best results a' and a" are each ~~both~~ approximately equal to 6°.

Moreover, as there is a greater reduction in the thickness of the head 2 at the extremities of the major diameter than at the extremities of minor diameter, resulting from the greater inclination of the part-spherical surface 3, the head 2 may be conveniently produced by a plastic deformation process, such as cold forming. Thus, where an oval-section screw head of uniform thickness is to be shaped by a pressure die, plastic flow takes place towards the extremities of the major diameter of the oval section. However, in the case of the head of a screw formed in accordance with the present invention, the extremities of the major diameter are more tapered than the extremities of the minor diameter so that the radial plastic flow is substantially uniform in all directions. It is therefore possible to obtain well-balanced and properly formed screw heads without causing any protrusion or incomplete shape due to the lack of

material at the lower surface adjacent the extremities of the major diameter.

As shown in Fig. 4, a screw having a head 2 shaped in accordance with the present invention may be rotated by a screw-driver 5 having a socket which, in cross-section, is complementary to the shape of the head 2.

Moreover, as shown in Fig. 4, the conical configuration of the head 2 is such that the socket may be formed so that there is a gap 7 between the upper, part-spherical surface 3 of the head 2 and the opposed surface of the socket, and the socket may co-operate with the head 2 so that there is always a gap 8 between the outer end of the socket and the surface of a member for example, the annular member 6, which the head 2 abuts.

In this way it is possible to fasten and unfasten screws formed in accordance with the present invention without any disfigurement of the screw head 2, and so it is possible to decorate the screw head 2 by giving its surface a polished or cloisonne finish, or a cut-glass looking finish.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A screw-threaded fastening element having a head which has the shape of a truncated oval-section cone with a part-spherical end surface at the smaller end of the head co-axially aligned with the intersection between first and second axial planes respectively containing the major and minor diameters of the cross-section of the head, and a radiused edge between the part-spherical end surface and the side surface of the head, the curvature of the radiused edge increasing from a minimum at the intersections of this edge with the first axial plane to a maximum at the intersections of this edge with the second axial plane.

2. A screw-threaded fastening element according to Claim 1, in which the ~~mean~~ inclination of the side surface of the head to the axis of the head is 6°.

3. A tool for use in rotating a fastening element according to Claim 1 or Claim 2, the tool comprising a socket formed with a tapering cavity of oval-shaped cross-section which is complementary to the truncated conical shape of the head of the fastening element.

4. A tool according to Claim 3, in which the dimensions of the cavity are such that the socket is only engageable with a part of the side surface of the head which is adjacent the radiused edge of the head.

5. A screw-threaded fastening element, substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

6. A tool substantially as hereinbefore described with reference to, and as illustrated in Fig. 4 of the accompanying drawing.

DATED THIS 13th Day of February, 1973

Jujiro OKADA
By His Patent Attorneys

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Fig.1

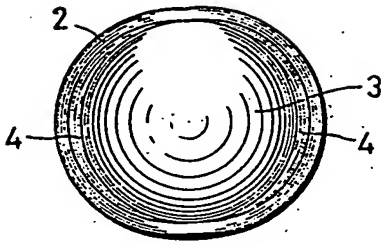


Fig.2

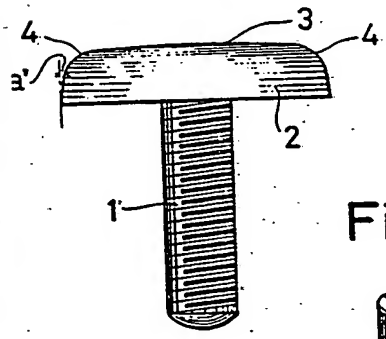


Fig.3

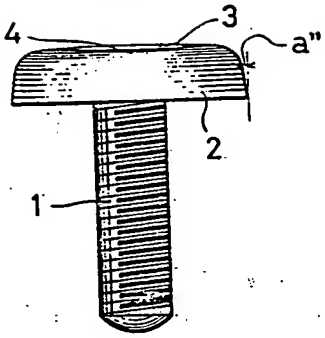
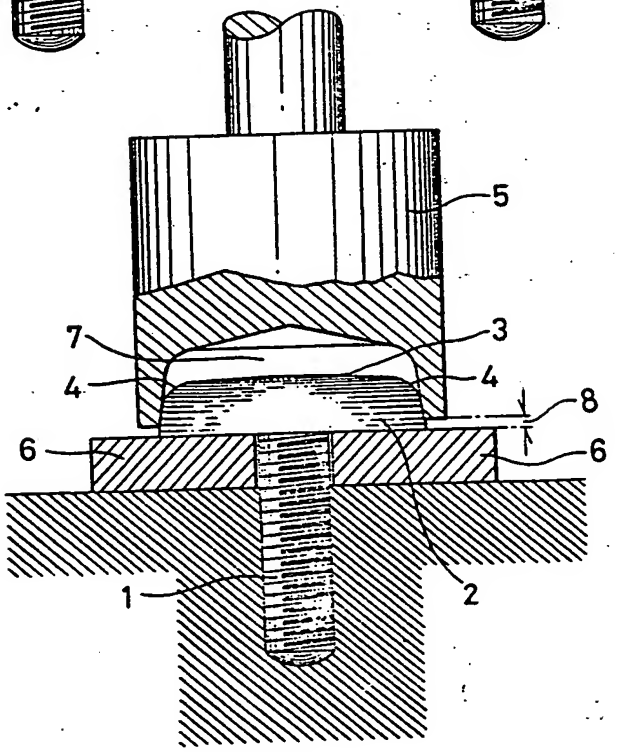


Fig.4



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